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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,365	03/30/2004	James Edward Simpson	140163-1/YOD GERD:0104	4687
7590 Patrick S. Yoder FLETCHER YODER P.O. Box 692289 Houston, TX 77269-2289			EXAMINER SONG, HOON K	
			ART UNIT 2882	PAPER NUMBER
			MAIL DATE 06/13/2007	DELIVERY MODE PAPER

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/813,365  
Filing Date: March 30, 2004  
Appellant(s): SIMPSON ET AL.

\_\_\_\_\_  
John M. Rariden  
For Appellant

**EXAMINER'S ANSWER**

**MAILED**  
JUN 13 2006  
**GROUP 2800**

This is in response to the appeal brief filed April 07, 2006 appealing from the Office action mailed December 28, 2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The rejection under 35 U.S.C § 103 (a) as being unpatentable over Carlson et al. (USPAT 4,577,340) in view of Carlson et al. (USPAT 5,978,447) has been withdrawn.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

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5,978,447	CARSON ET AL.	11-1999
6,819,741	CHIDESTER	11-2004
4,577,340	CARLSON ET AL.	3-1986
2004/0109538 A1	MCCARTHY, JR.	6-2004

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 4-8 and 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson et al. (US 5,978,447) in view of Chidester (US 6,819,741B2) and Carlson et al. (US 4,577,340).

Regarding claims 1, 7 and 14, Carson ('447) teaches a CT system, comprising:

- a gantry (16) adapted to rotate about a volume;
- an X-ray tube (12) mounted on the gantry, the X-ray tube, comprising:
- an anode assembly (figure 2), comprising:
- a target (55) for emitting X-rays upon irradiation with an electron beam (62),
- a rotor shaft (75, 70) coupled to a motor rotor system (80) and the target, the rotor shaft (75, 70) configured to rotate the target (55), and

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a bearing system (78) comprising at least two bearings (90a, 90b) supporting the rotor shaft (figure 1); and

a cathode (59) assembly, comprising:

a cathode (59) configured to emit the electron beam,

an X-ray detecting unit (20) configured to detect the X-rays emitted from the X-ray tube (12) and transmitted through the volume and to generate a detector output signal in response to the detected X-rays;

an X-ray controller configured to operate the X-ray tube;

a data acquisition system (32) for receiving the detector output signal;

an image reconstructor (32) coupled to the data acquisition system (20) for generating an image signal in response to the detector output signal; and

a computer for controlling the operation of at least one of the X-ray controller, the data acquisition system and the image reconstructor (column 6 line 8-37).

Carlson ('477) fails to teach that the cathode has an insulator isolating the cathode from ground potential.

Chidester teaches an x-ray cathode insulator (40 or 70).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the x-ray tube of Carlson with the cathode insulator as taught by Chidester, since the insulator would reduce arcs causing potential damage of the x-ray tube.

Furthermore, Carlson ('477) fails to teach the bearings are duplex bearings.

Carlson ('340) teaches an x-ray target shaft support bearing system having at least two duplex bearings (78, figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the bearings of Carlson ('477) with the duplex bearing as taught by Carlson ('340), since duplex bearing would improve durability, noise and smooth operation.

Regarding claim 2, Chidester teaches the insulator comprises a conical insulator (40).

Regarding claim 4, Carlson as modified by Chidester teaches the insulator is offset in a radial direction to the motor rotor system (figure 2).

Regarding claim 5, Carlson ('340) teaches the at least two duplex bearing assemblies distribute load substantially evenly (figure 1).

Regarding claims 6, 13 and 18, Carlson ('447) teaches the at least two bearing assemblies straddle the target (figure 2).

Regarding claim 8, Chidester teaches the insulator comprises a conical insulator (40).

Regarding claim 10, Carlson ('447) teaches the cathode is offset in a radial direction to the motor rotor system (figure 2).

Regarding claim 11, Carlson ('447) teaches a collimator (18) to direct the beam to the subject.

Regarding claim 12, Carlson ('447) teaches the at least two bearing assemblies distribute load substantially evenly (figure 2).

Regarding claim 15, Carlson ('447) teaches a fixed stem (100).

Regarding claim 16, Carlson ('447) as modified above teaches the rotor shaft (70) is coupled with the fixed stem (100) via the at least two duplex bearing assemblies (78 of Carlson ('340)).

Regarding claim 17, Carlson ('340) teaches the at least two duplex bearing assemblies allows load to be distributed substantially evenly (figure 1).

Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCarthy, JR. (US2004/0109538A1).

Regarding claims 19-20, McCarthy teaches a method for CT imaging, the method comprising:

rotating a gantry (12) about a subject (20) at about three rotations per second (paragraph 0027, line 8-10);

emitting X-rays from an X-ray tube (18) mounted on the gantry (12); and

generating one or more images of the subject based upon the attenuation of the emitted X-rays by the subject (CT imaging, figure 1).

McCarthy fails to teach a method of rotating the gantry comprising rotating the gantry at speed greater than three rotations or at approximately five rotations per second.

However it would have been obvious to one of ordinary skill in the art at the time of the invention to rotate the gantry of McCarthy at speeds greater than three rotations or at approximately five rotations per second, since the faster gantry speed would reduce x-ray scanning time for reducing overall patient dose.

Regarding claim 21, McCarthy teaches a CT system, comprising:  
means for rotating a gantry (12) about a subject (20) at three rotations per second or faster (paragraph 0027, line 8-10);  
means for emitting X-rays from an X-ray tube (18) mounted on the gantry; and  
means for generating one or more images of the subject based upon the attenuation of the emitted X-rays by the subject (CT imaging, figure 1).

**(10) Response to Argument**

Appellant's arguments presented in the Appeal Brief filed 4/7/2006 have been fully considered but they are not persuasive.

With respect to the first ground of rejection:

Appellant asserts the present invention, as recited in independent claims 1, 7 and 14 is patentable over Carlson '447, Chidester and Carlson '340, alone or in combination. In particular, the appellant contends that Chidester fails to teach the insulator and the motor rotor system being located on the same side of the target as recited in claims 1 and 7 of the present application (see Appeal Brief P.7, lines 21 to P.8, line 5).

The examiner agrees with appellant's statement, however it should be recognized that the appellant's argument fails to address the modification set forth in the rejection. Specifically Chidester was not applied as anticipatory under 35 U.S.C §102, but rather under 35 U.S.C §103 for what it reasonably would teach one of ordinary skill in the art. In this case, the claims were rejected under 35 U.S.C §103 over Carlson '447



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in view of Chidester and Carlson '340. Carlson '447 clearly teaches a cathode assembly 59 and a motor rotor system 80 being located on a same side of a target (figure 2). Although Carlson '447 fails to specifically teach an insulator that insulates cathode, the skilled artisan would have recognized that an insulator must be utilized, otherwise the cathode would short to ground via the metal housing rendering the x-ray tube inoperable. Chidester teaches a suitable insulator 40 for an x-ray cathode 16 to prevent electric arc. The adoption of Chidester's insulator in Carlson '447 cathode assembly would result in an x-ray tube having the insulator and the motor system being located on the same side of the target as required by the claims. It is important to note that the modification does not change the operation or position of the cathode assembly (59) which is located on the same side of the target as the motor rotor system (80).

Additionally, with respect to claim 14, the appellant asserts that Carlson '447 and Carlson '340 fail to teach at least two duplex bearing assemblies straddling the target as recited in claim 14 (see Appeal Brief P.8, lines 6-14).

The examiner agrees with appellant's statement, however it should be recognized that the appellant's argument fails to address the modification set forth in the rejection. Specifically Chidester was not applied as anticipatory under 35 U.S.C §102, but rather under 35 U.S.C §103 for what it reasonably would teach one of ordinary skill in the art. In this case, the claims were rejected under 35 U.S.C §103 over Carlson '447 in view of Chidester and Carlson '340. In this case Carlson '447 teaches two bearing assemblies straddling a target, but fails to teach that bearings are duplex bearing. Carlson '340 was relied on to teach duplex bearings 78 which assure long life and

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improved durability. The substitution of the duplex bearings as taught by Carlson '340 for two bearing assemblies of Carlson '447 would result in an improved x-ray tube.

Again, the modification does not change the positions of the bearings (90a, 90b), rather only replaces the bearing with duplex bearing assemblies of Carlson '340.

Appellant asserts that the examiner fails to supply sufficient reason as to why one skilled in the art would combine the cited references to construct the x-ray tube as recited in the present claims. In particular, Carlson '447 reference specifically discloses an arrangement of bearing assembly (68) that does not require additional electrically insulation with respect to the cathode assembly (55). One of ordinary skill in the art, therefore, would not read the disclosure of Carlson '447 reference and be motivated to combine those teaches with the teachings of the Chidester reference relied (see Appeal Brief P.8, lines 15 to P.9, line 2).

The examiner disagrees. Carlson '447 teaches the x-ray tube is configured with a bi-polar arrangement (column 6 line 59 – column 7 line 11). The electrons are emitted from the cathode filament 62 and accelerated toward the anode assembly 55 due to a very large DC electrical potential difference between the cathode focusing cup 60 and the anode assembly 55. The cathode focusing cup 60 is at an electrical potential of -75,000 volts with respect to ground, and the anode assembly 55 is at an electrical potential of +75,000 volts with respect to ground. Carlson '447 teaches that this electrical potential difference necessitates electrical insulation between the various tube components (column 1 lines 33-41). Although an insulator is not explicitly found in Carlson '447, the above teaching provides ample motivation to provide an insulator to

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the cathode as discussed by Chidester. The teaching highlighted by the appellant (Carlson '447, column 9 line 65 - column 10 line 4) refers to insulation of the bearing assembly (62), which does not obviate the necessity of insulating the cathode from other tube components.

The appellant asserts that Carlson '340 does not teach that it is the dual bearing that improve durability. But that it is the use of lubricants with the bearing (Carlson '340, column 4 line 60-61) (see Appeal Brief P.9, lines 3-17).

The examiner disagrees. Those of ordinary skill in the art recognize that duplex bearing assembly comprise a pair of bearings, which reduce the stress load on each of the bearings. Consequently, a duplex bearing assembly will have a longer service life than a single bearing. For this reason, skilled artisan would have been motivated to replace the single bearing of Carlson '447 with duplex bearing assembly of Carlson '340's in order to improve durability, noise and reduce operational friction of the rotary target.

The appellant contends that the examiner's conclusion of obviousness is not obvious to one skilled in the art and the examiner is impermissibly using hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention (see Appeal Brief P.9, line 18 to P.10, line 7).

The examiner disagrees. It must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of

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ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper.

With respect to the second ground rejection:

Appellant's argument is persuasive. Accordingly, this rejection has been withdrawn.

With respect to the third ground rejection:

The appellant asserts the present invention as recited in independent claims 19 and 21 is patentable over McCarthy. In particular, the appellant contends that McCarthy's gantry is not capable of rotating at velocities higher than greater than 3 revolution per second (see Appeal Brief P.11, line 21 to P.12, line 5).

The examiner disagrees. Appellant's claims 19 and 21 only require the step of or means for rotating the gantry at speeds greater than 3 revolutions per second. This limitation encompasses all rotation speeds including rotating speeds that are only slightly greater than three revolutions per second, 3.00000001 revolutions per second being an example. McCarthy clearly teaches a variety of speeds including a rotation speed of "about two to three revolutions per second" (see paragraph 0027 bridging columns 1 and 2). The term "about" has been held to be a broad and flexible term having a meaning similar to "approximately" and "nearly." Additionally, the term has also been held as warning that exactitude is not necessary to allow for contemplated and slight variations. For these reasons, McCarthy is consider to suggest and thus

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render obvious rotations speeds that are slightly greater than three revolutions per second since such speeds must be said to be "about" three revolutions per second. Further, as stated in the rejection, rotation speeds of greater than three revolutions per second would clearly reduce the scanning time thereby reducing overall patient dose. Consequently, appellant's arguments are not persuasive and the rejection should be maintained.

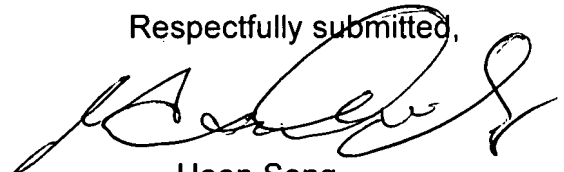
For the above reasons, it is believed that the rejections should be sustained.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



Hoon Song

Primary Examiner

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Conferees:

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